

different, as the light and dark forms merge into each other, instead of separating neatly into typical, intermediate and melanic specimens as did the Manchester populations.

I have been unable to find out anything about the prevalence if these melanic forms elsewhere in Scotland. If any reader could help, I would be most grateful.—ROY LEVERTON, Whitewells, Ordiquhill, Cornhill, Banffshire AB45 2HS.

### **Egg-laying bias in *Pieris brassicae* (L.) and *Pieris rapae* (L.) (Pieridae) on garden nasturtium**

During two days in 1988 and 1989, counts of eggs were made of the large and "small" white butterflies on garden nasturtium in a circular rockery (diameter: 2.2 metres), the centre of which was dominated by a *buddleia* bush. Although *Pieris napi* was seen laying on *Aubrieta* and small crucifers such as *Cardamine hirsuta* L., only *P. rapae* was observed laying on *Tropaeolum major*.

By 1 August 1988, 27 egg batches of *P. brassicae* and 87 eggs of *P. rapae/napi* had been laid on a total of 893 leaves of *Tropaeolum*. Egg-laying in both species was biased for aspect (*P. brassicae*,  $\chi^2_{(3)} = 24.4$ ,  $P < 0.001$ ; *P. rapae/napi*,  $\chi^2_{(3)} = 24.9$ ,  $P < 0.001$ ). Plants in the rockery were divided into four quadrants about north-south and east-west axes. The distribution, clockwise from north-west was 1:2:18:6 in *P. brassicae* and 8:8:38:33 in *P. rapae/napi* for a leaf distribution of 162:226:230:275. Bias, in both species, was for the south, particularly the south-east quadrant.

In July 1989, *Tropaeolum* was distributed only over the southern half of the rockery. On 29 July 1989, 16 egg batches of *P. brassicae* and 74 eggs of *P. rapae/napi* were found on 371 leaves. No significant bias was found in aspect between east and west regarding the distribution of eggs (*P. brassicae*,  $\chi^2_{(1)} = 0.09$ ,  $P > 0.7$ ; *P. rapae/napi*,  $\chi^2_{(1)} = 0.68$ ,  $P > 0.3$ ).

While making observations on the distribution of eggs in relation to aspect, some other data were collected. In both 1988 and 1989, *P. brassicae* biased egg-laying to the undersurface of leaves (1988:  $\chi^2_{(1)} = 13.4$ ,  $P < 0.001$ ; 1989:  $\chi^2_{(1)} = 6.3$ ,  $P < 0.02$ ), whereas results for *P. rapae/napi* contrasted between the two years, the bias in 1989 being for leaf under surfaces (1988:  $\chi^2_{(1)} = 2.2$ ,  $P > 0.1$ ; 1989:  $\chi^2_{(1)} = 40.5$ ,  $P < 0.001$ ). During 1988, if anything, there was a tendency in *P. rapae/napi* for egg-laying to be concentrated on the upper surface of leaves. A further indication of this was found in the seven cases of joint egg-laying by both species on the same leaf. Of these, only two were on the same surface; six of seven each of *P. brassicae* and *P. rapae/napi* were found on the under surface and upper surface of leaves respectively. In 1989, comparisons were also made for shade (under *buddleia*) and leaf size. For *P. rapae/napi* there was bias for sites exposed to sunlight ( $\chi^2_{(1)} = 20.8$ ,  $P < 0.001$ ), but no bias for *P. brassicae* ( $\chi^2_{(1)} = 2.4$ ,  $P > 0.1$ ). Plants were divided into three categories with small, medium and large leaves. No bias was found in selection for leaf size. Finally, in 1989, details were taken of egg batch size. In *P. brassicae* mean egg batch size was found to be 18.8 ( $\sigma = 10.5$ ,  $N = 16$ ) with a minimum of three and a maximum of 32 eggs. For *P. rapae/napi* 48 of the eggs were

laid singly, eight in pairs, two in a batch of four. One cluster of five eggs was found to comprise two groups of three and two eggs that had been laid at very different times.

The bias in aspect suggests that egg-laying preferences are for warm microclimates. This is supported by the selection of exposed sites by *Pieris rapae/napi*. Lack of bias for exposed, compared to shaded, sites in *P. brassicae* may relate to the small numbers of egg batches found; this, and the fact that sunlight penetrated the leaf cover of the *Buddleia* bush on the south side during short periods of the day and that egg-laying may have been carried out in temporary patches of light. The significant tendency for oviposition to be under leaf surfaces probably relates to egg concealment (Dennis, 1992. *The Ecology of Butterflies in Britain*. Oxford University Press). The difference between the two years for *P. napi/rapae* is difficult to explain, especially as no distinction could be made between the two species responsible for laying the eggs. Leaf structure may also affect the balance of eggs laid on upper and under surfaces, as observed in other species (e.g., *Polyommatus icarus* Rott. (Lycaenidae) (Dennis, 1984. *Entomologist's Gazette*, **35**: 89-93). As a last point, it is worth commenting on the relatively small size of *P. brassicae* egg batches. These would tend to indicate that *Tropaeolum* is not entirely suitable as a hostplant for the species.— R.L.H. DENNIS, 4 Fairfax Drive, Wilmslow, Cheshire SK9 6EY.

### Cross-species pairings of noctuids (Lep.: Noctuidae) at sugar

Sugaring was particularly effective at my home address in early July 1996. Well over 200 noctuids at once attended the 24 sugared fenceposts in damp, cloudy weather on the evening of 3rd/4th, not allowing for any turnover of individuals. Some of the posts were more popular than others, and here moths were literally barging and jostling for space.

On the second round, shortly after midnight, a veritable bacchanalia met my eyes. Many moths were already the worse for drink, even though I consider it morally wrong (and such a waste!) to put alcohol in my sugar. Not only were the moths fighting, they were mating too. As at all the best orgies, some unexpected couplings could be observed. I noted:

Dark Brocade *Blepharita adusta* Esp. male with  
female Clouded-bordered Brindle *Apamea crenata* Hufn.

Pale-shouldered Brocade *Lacanobia thalassina* Hufn. male with  
female Clouded-bordered Brindle *A. crenata* Hufn.

Alas, like most recreational sex, nothing came of it. My hopes of seeing a few Clouded-bordered Brocades and Pale-shouldered Brindles the following summer were unfulfilled.— ROY LEVERTON, Whitewells, Ordiquhill, Cornhill, Banffshire AB45 2HS.